

10 animals with pre-historic roots

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Ever since the first discovery of dinosaur fossils, people have been captivated; wondering what life would be like if prehistoric animals and humans co-existed. Who isn't gripped by the thrilling concept of a giant lizard predator chasing them down the street? Or merely by being able to wave at a passing Stegosaurus?

That said, humans already share the planet with species that are just as old as dinosaurs and others that are directly descended from them. Some haven't changed much over the past tens of millions of years, whilst others are practically unrecognisable.

1. Crocodiles

This is what you came for: big, scary reptiles, right? Well, crocodiles share a heritage with dinosaurs as part of a group known as archosaurs ("ruling reptiles"), who date back to the Early Triassic period (250 million years ago). The earliest crocodilian, meanwhile, evolved around 95 million years ago, in the Late Cretaceous period. Modern day crocodiles descended from prehistoric alligators such as *Deinosuchus*; low to the ground water-dwelling predators with a long snout, a powerful tail and lots and lots of teeth.

Interestingly, aside from crocodiles, the only other archosaurs known to have survived into the modern era are birds. This means that crocodiles are closely related to the ducks in your local pond, so be careful the next time you go to feed them (just in case).



The earliest crocodilian evolved around 95 million years ago.

2. Cassowaries

Judging by its giant, claw-like feet alone, it's easy to see why people think this giant bird is directly descended from dinosaurs such as velociraptors. They are the third largest bird species in the world and have been known to attack humans. These creatures can be found in northern Australia, Papua New Guinea and Indonesia, and have signature blue necks. Some fun facts for you: they produce green eggs and are also really good swimmers.

One of the other characteristics that may link the cassowary to dinosaurs is their casque – the leathery crest on their heads from which their name is derived (“kasu” means horned in Papuan, while “weri” means head). The use of this quiff-like appendage is a topic of some debate. Some scientists believe it can be used to reduce heat¹, while others suggest it's used to help the cassowary achieve its booming call², which can hit frequencies that are too low for humans to hear.



Cassowaries are the world's third largest bird species.

3. Tuatara

Here is a similarly remarkable beast, and the sole survivor of a genetic lineage that originated in the early Triassic. Tuataras are members of the reptile group Rhynchocephalia, which blossomed into full diversity between 240 million and 60 million years ago. They live in the islands off the coast of New Zealand, feeding on beetles, spiders, and snails, as well as small birds that they decapitate with their saw-like teeth. Tuatara can live to be around 100 years old and operate surprisingly well in low temperatures.

They may be commonly referred to as a living dinosaur, but to illustrate just how genetically isolated tuataras have become as a species, let's look at some statistics.³ Among the animal grouping "amniote vertebrates", there are 30,000 modern species divided into six major groups: birds (at least 15,845), lizards and snakes (10,078), mammals (5,416 species), turtles (341), crocodilians (25), and, erm, tuatara (1).



Tuatara are the sole survivors of a genetic lineage that originated in the early Triassic period. © Kevin Schafer

4. Sharks

In a way, it's an insult to sharks to consider them modern day dinosaurs because they're much older. Their ancestors evolved into recognisably shark-like shapes over 450 million years ago, during the Silurian period. They have survived every major extinction event since the seas were filled with Trilobites ↗. By contrast, dinosaurs are just a flash in the pan.

With a lineage this lengthy, the scope for diversity⁴ in terms of their make-up and appearance is huge. As with many of the species in this list, there are giants lurking in the shark family tree, such as the *Megalodon*. And while we may think that hammerhead sharks are odd, their T-shaped heads are nothing compared to the dinner plate sized, spiral-shaped tooth structure of the *Helicoprion*, or the anvil-shaped dorsal fin of the *Stethacanthus*. Some species of shark even developed the ability to glow in the dark, which would have made *Jaws* a very different film, visually speaking.



Sharks have survived major extinction events.

5. Lizards

While they share a reptilian ancestry that goes back millions of years – and have many common genetic traits, such as the laying of eggs – lizards and dinosaurs went on to follow separate paths of development. This is most evident when you consider their legs. If you imagine any of your favourite dinosaurs, their legs point straight to the ground, like those of horses or humans. By contrast, lizards and crocodiles have legs that sprawl out to the side.

In fact, for all that dinosaur means “terrible lizard”, lizards are only a distant relation to any archosaurs, having split from their common ancestry when they first emerged in the Late Triassic. They – and their snake cousins, under the banner of squamates – went on to adapt and change, resulting in more than 10,000 living species and hundreds of now-extinct ones. Depending on circumstance, lizards have had the time to develop a breath-taking arsenal of abilities; swimming, gliding, scaling trees and hanging from ceilings, climbing sheer surfaces, walking on water and losing and re-growing their own tails. This extreme adaptability is almost certainly the key to their survival in the face of several significant extinction events.



Lizards are extremely adaptable reptiles.

6. Crabs

They're not dinosaur descendants, they're not lizards and they did not evolve into birds, but crabs deserve a special mention in this list for developing the kind of personal armoury that, pound for pound, would make an Ankylosaurus think twice.

Lobsters and other filter-feeding crustaceans first emerged millions of years before dinosaurs, and in fact the creatures we call horseshoe crabs (more closely related to spiders than modern crabs) appeared around 450 million years ago. But true crabs are a dinosaur-era phenomenon, as they arrived on the scene between 200 and 150 million years ago. They flourished so well in fact, that scientists have ascribed a name to their greatest period of diversity, during which 80% of modern crab groups evolved: “the Cretaceous crab revolution”.⁵ Their diversification paved the way for crabs to inhabit a wide variety of environments. This laid the groundwork for them to survive the mass extinction event that wiped out three quarters of the plant and animal species on Earth, including dinosaurs.



Crabs have diversified to inhabit a wide variety of environments.

7. Ostriches

Ostriches, cassowaries, kiwis and emus belong to a group of large flightless birds called ratites. Their link with the dinosaurs? Ornithologist Peter Houde⁶, of the Smithsonian Institution, put forward the theory that small dinosaurs evolved into small birds, some of which flew to environments where their success as a species depended on staying on the ground. He felt that ratites had evolved “backwards” into a loss of flight, otherwise there could be no explanation for their sudden appearance in various island landmasses. The reverse evolution might also explain the shaggy feathers and “reptile jaw” of the ostrich, which may have grown to its current size in order to fight off larger predators.



Ostriches, cassowaries, kiwis and emus belong to a group of large flightless birds called ratites. © Anup Shah

8. Sea turtles

Turtles are exceptionally successful as a species. They are part of the Testudine group of reptiles, including tortoises and terrapins, found on every continent apart from Antarctica, which have evolved to live on land and in both salt and fresh water. They share common ancestry with dinosaurs – having first appeared around 230 million years ago – and show remarkable resilience considering their fellow creatures are being wiped out. Turtles also survived one mass extinction at the end of the Triassic period that left an evolutionary space for dinosaurs to evolve, as well as the one at the end of the Cretaceous era that then wiped out the dinosaurs.

Those shells are clearly very tough, because immediately after that catastrophe, turtles began to diversify, hugely. There is some debate as to whether turtles count as archosaurs or whether they are more closely related to snakes and lizards. Dr Terri Cleary from the Museum of Birmingham explained the problem: “They probably originate from some sort of reptile that gradually expanded its ribs out and those became its shell. But we don't have that many informative transitional fossils.”⁷



Turtles share common ancestry with dinosaurs.

9. Chickens

The evolutionary link between dinosaurs and birds is well established, even within the not-always-scientifically-accurate world of Jurassic Park. A more recent discovery is that one particular dinosaur – the T. rex – shares some fundamental molecular structures with the common chicken.

In 2003, Jack Horner and Mary Schweitzer were attempting to extract a giant fossilized T. rex femur from a dig and had to break the bone in half to do so.⁸ Inside, they found molecules of the structural protein collagen, which takes different forms in different animals, acting as a kind of protein fingerprint. As there was no other dinosaur collagen to work with, they cross-referenced the Tyrannosaurus collagen with modern day animals, including humans, mice and salmon. The closest match was found in chickens and ostriches – two species that have surprisingly little in common, genetically speaking – with alligators coming in third.



The T rex shares some fundamental molecular structures with the common chicken.

10. Snakes

If any animal deserves to be called a terrible lizard, it's a snake. They have populated our nightmares for so long and taken a central role in our phobic mythologies. Even Harry Potter's villainous Voldemort has a snake as a pet. There is, as the Beatles might put it, something in the way they move.

The snake is another species that evolved to how we know it today by getting rid of key assets – most notably legs, and several bones in the skull that prevented total mobility.⁹ The Cretaceous-era marine squamate *Pachyrhachis problematicus* (as described by Michael Caldwell and Michael Lee in *Nature*) can be considered a primitive snake.¹⁰ It has an elapine slender body and mobile skull with extra joints for larger prey, but also a working pelvis and hind limbs.

Oh, and if you didn't already find snakes creepy enough, consider this: because they have such narrow bodies, snakes have arranged their kidneys one in front of the oth-er, rather than side by side. For the same reason, snakes either predominantly favour the right lung over the left, or get by with just the one. Sleep tight!

So, the next time you find yourself watching Chris Pratt trying to do his Velociraptor-whisperer act in *Jurassic World*, consider how much more realistic it might be to have him face down three angry emus, or a crocodile with a grudge.

We are walking with dinosaurs all the time and we should continue to be both grate-ful and amazed that this continues to be the case.



The snake is another species that evolved to how we know it today by getting rid of key assets.

- 1.** The cassowary's crest ↗, **2.** Cassowary call, ↗ **3.** Tuatara statistics ↗, **4.** Shark diversity ↗, **5.** The Cretaceous crab revolution ↗, **6.** Evolution of small dinosaurs ↗, **7.** Origin of sea turtles ↗, **8.** Giant fossilised T. rex excavation ↗, **9.** Snake evolution ↗, **10.** The Cretaceous-era marine squamate ↗